

From the house of Amar Chitra Katha and Tinkle

# BRAINWAVE™

SCIENCE IS JUST A GAME

Vol. 02 Issue 02  
February 2013  
48 pages  
8-14 years  
₹60

p11 **Eureka!**  
**He did it.**

**Discoveries  
& Inventions**

11 pages of comics

5 fun-do activities

12 gifts to be won

p24 **Grab your poster**

p27 **Be a 'Smartenstein'**

p47 **It's Sci-Q Time**

p45  
**Join the  
BW Fun-do  
Band!**



# MEET THE SMARTIES



**Dr. Dodo:** Dr. Dodo is the co-founder of BW Labs and is the last living dodo. He holds a PhD in anachronomaly and parallel universes from the University of Clockwindistan. He invented the Galileo series of time machines.



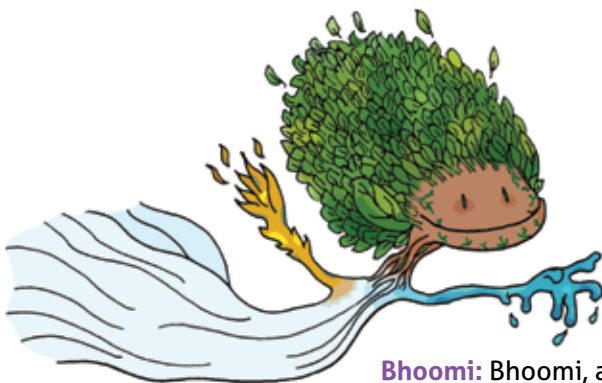
**Skree!:** Skree! is the other founder of BW Labs. She loves dangerous experiments. She makes mini black holes before breakfast and has dark matter for lunch.



**Arby:** Arby is a genius who will grow up to be Aryabhata. He came to the future, thanks to Dr. Dodo's time machine. He is a fan of numbers, banana fritters and robot wars.



**Alby:** Alby will grow up to be Albert Einstein. However, now, like Arby, he too has been sucked into the future. When he is not researching, he plays the violin.



**Bhoomi:** Bhoomi, a.k.a. Bhoo, is an enigma. No one knows where she is from and how she came into being. She is made up of earth, wind, fire, and water in equal parts. Her alter-ego is Gaia Goel, a world famous science sleuth.

## A Curious Quest

Dear Reader,

The mind is a wonderful thing. It teems with several questions. Our ability to be curious, ask questions and seek answers makes us unique. Humans have discovered and invented for centuries to enable this technological age.

From early tools to *inking space* ☞, science has evolved. In this issue, we discuss some of the greatest discoveries and inventions that have changed our lives.

Read it, keep exploring and never say that your curiosity has been satisfied!

Scientifically,  
JD, [jayadev.calamur@ack-media.com](mailto:jayadev.calamur@ack-media.com)

### Editor

Jayadev Calamur  
[jayadev.calamur@ack-media.com](mailto:jayadev.calamur@ack-media.com)

### Consulting Editor

Vandana U  
[vandana@ack-media.com](mailto:vandana@ack-media.com)

### Designer

Kashmira Sarode  
[kashmira.sarode@ack-media.com](mailto:kashmira.sarode@ack-media.com)

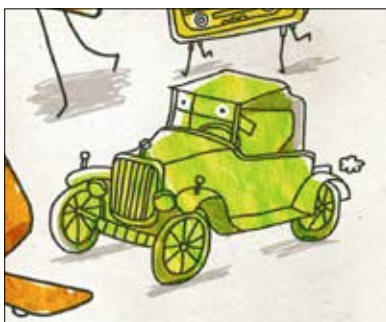
### Resident Geek

Kayomarz Bacha  
[kayomarz.bacha@ack-media.com](mailto:kayomarz.bacha@ack-media.com)

### Founding Editor

Vinayak Varma

Cover artwork by **Bombay Duck Designs**



### Advertising Sales:

[advertisingsales@ack-media.com](mailto:advertisingsales@ack-media.com)

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Vice-President

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Key Account Manager

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#### Chennai:

Consultant

Shankar Jayaraman +918754443553

#### Bengaluru:

Key Account Manager (South)

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### Brainwave Business Head

Sasikanth Chemalamudi

[sasikanth.c@ack-media.com](mailto:sasikanth.c@ack-media.com)

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[brainwave@ack-media.com](mailto:brainwave@ack-media.com)

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# BRAINWAVE™

## CONTENTS

COVER  
STORY

11

# INVENTIONS AND DISCOVERIES



In which we crack a few hard nuts to make life easy, discover and understand our universe better, and even create life artificially.



## DO AND LEARN

- p.04 Toybox
- p.19 Eye See
- + p.28 Third Law
- + p.30 DIY
- + p.37 Magic Science
- ▲ ■ p.37 Planet Ninjas



## FREEBIES



p.24 Poster

## READER CONTRIBUTION

- p.26 Fan Fiction
- p.27 Solutions & Winners
- p.27 Letters from Readers



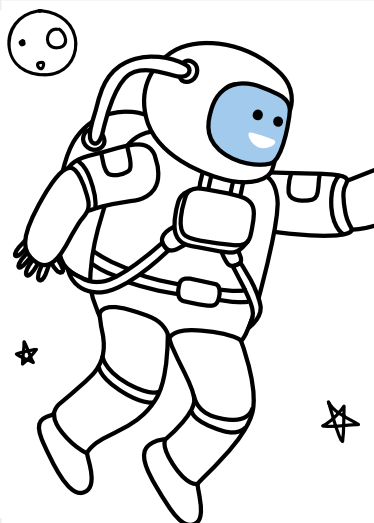
## FUN-DO FACTS

- + p.18 Nuts & Dolts
- p.29 Story Storeys
- p.36 Wacky Tech
- p.42 Celeb Science
- + p.44 Arby Files



## COMICS

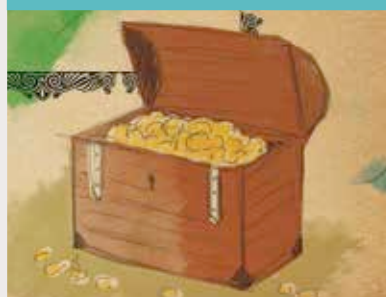
- ▲ p.06 Toon Talk
- p.08 History Maker
- ▲ ■ p.20 The Smarties
- + p.32 Multiverse
- + p.40 Science Fiction



## KNOW IT ALL

- p.07 Ask Us Why
- + p.10 Flash News
- + p.34 Geek Speak
- p.38 Animalia
- p.43 Golden Gizmo

## CONTESTS



- p.45 BW Fun-do Band
- p.46 Treasure Hunt



# Lights, Camera, Action!

*Light  
things  
up in  
the dark  
without  
electricity  
or fire!*



by Arvind Gupta  
& Kayomarz Bacha

## To make a solar bulb, you need:

- A cardboard box
- A 500ml transparent bottle filled with clear water
- An empty 1 litre bottle
- A pair of scissors
- Brown tape
- A sheet of black chart paper
- A set of photographs or drawings



## Method:

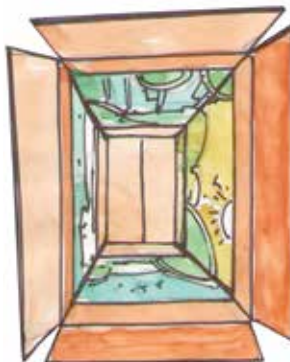
### Step 1

Open the cardboard box from the top.



### Step 2

Stick the pictures or drawings on the inner walls of the box.



### Step 3

Seal the box with the brown tape in such a way that no light enters the box. Use the black chart paper to cover gaps.



#### Step 4

Cut a hole at the top of the box. Through this, suspend the 500ml bottle filled with clear water. If required, use the brown tape. Ensure that no light passes through gaps.

Cut out another small hole on the front so that you can look inside.



#### Step 5

Cut the bottom of the empty 1 litre bottle. Stick black chart paper on the outside of the bottle.



#### Step 6

Use this to cover the 500ml bottle that is suspended into the cardboard box.

Look into the box through the peephole. It will be dark.

**Your solar bulb is ready.**

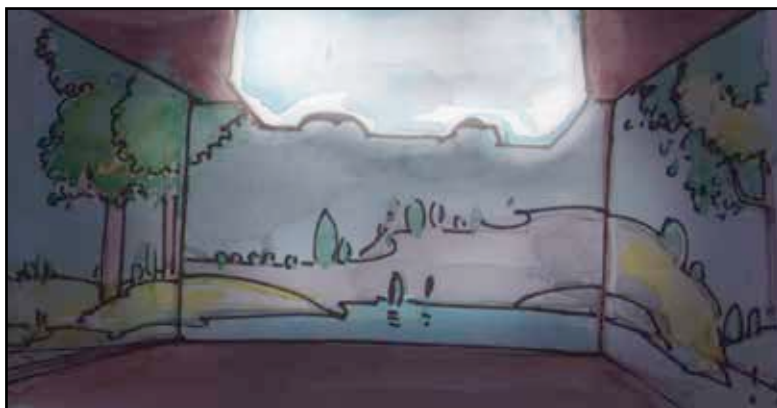


#### Why does this happen?

Light travels in a straight line, in the form of rays. Here, light rays pass through multiple mediums of varying density – air, plastic and clear water – to enter the cardboard box through the 500ml bottle. In this process, they change direction and get dispersed.

This phenomenon is called refraction. It is responsible for the formation of rainbows.

Remove the cover of the 500ml bottle and look into the box again. The interiors of the cardboard box will light up as if an electric bulb has just been turned on! ■



#### Advantages

The advantages of the solar bulb are overwhelming for low-income homes, which are deprived of electricity and ventilation. It is surprisingly effective, cheap and easy to make. If you add some bleach to the water, it stays clear, clean and germ-free!

Try this at home and get a chance to win a free science toy! Click snaps or list down your observations and email them to [kayomarz.bacha@ack-media.com](mailto:kayomarz.bacha@ack-media.com)

by Upasna Menhdiratta



Horace Wells noticed that nitrous oxide (laughing gas) affected people's perception of pain, and invented the use of anesthesia in dentistry.



Percy Spencer, while building radar systems, realised that the microwaves melted a chocolate bar in his pocket. He researched further and invented the microwave oven.





by Srinath Perur

# Cracking the Code of the Pyramid

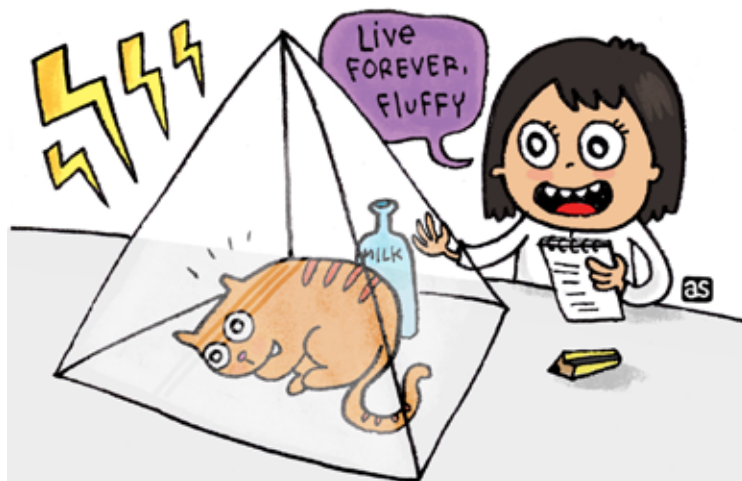
**Nanki Arora asks:**  
I have read that pyramids tend to gather and store energy. Can other shapes do this as well?

**I**n the 1930s, a few people in Europe had begun to get excited about 'pyramid power'. It was thought that food, milk or a dead animal would not rot when kept in a pyramid of accurate dimensions.

Then Karel Drbal from Czechoslovakia registered a patent for maintaining the sharpness of razor blades by keeping them in a hollow pyramid that would somehow gather the Earth's magnetic field and put it to work. A lot of razor-sharpening pyramids were sold. But, no one could scientifically prove that these things worked.

Similarly, despite many experiments, there is no firm evidence that milk or food kept in a hollow pyramid does remain fresh for longer periods.

But the idea persists, as



does the general feeling that pyramids are magical structures that can restore lustre to tarnished jewellery, dehydrate flowers without losing their form or colour, increase the growth rate of plants and assists in general healing. Hopefully in future, scientists can crack the pyramid code.

Are there other such shapes? Here is one that certainly works – the parabola. A parabola is a curve that reflects light or radio waves that fall on its surface to a single point. TV signals are gathered by a parabolic dish

antenna. Many large telescopes use parabolic mirrors to gather light from faraway objects in space. One can also cook food in a solar cooker that uses a parabolic lens to collect and focus the sun's energy.

If you want to store food longer, an option could be to store it in a pyramid. But, for now, a fridge is definitely more reliable! ■

~~~~~  
Have a burning question? Email to [brainwave@ack-media.com](mailto:brainwave@ack-media.com) with 'Ask Us Why' as the subject. The best question will win the latest Amar Chitra Katha animation CD!  
~~~~~

## THE EVOLUTION OF COMMUNICATION

Script by Jayadev Calamur

Artwork by Parvati Pillai

IN THE BEGINNING THERE WAS  
NOTHING.

**BANG!**

THEN, THE UNIVERSE WAS CREATED.

I am hot!

MAN WAS BORN A  
FEW BILLION YEARS AFTER  
THE EARTH COOLED DOWN.

THE EARTH FORMED  
A FEW BILLION YEARS  
AFTER THE UNIVERSE WAS CREATED. IT WAS A HOT BALL  
OF GASSES AND FIRE THAT SLOWLY COOLED DOWN.

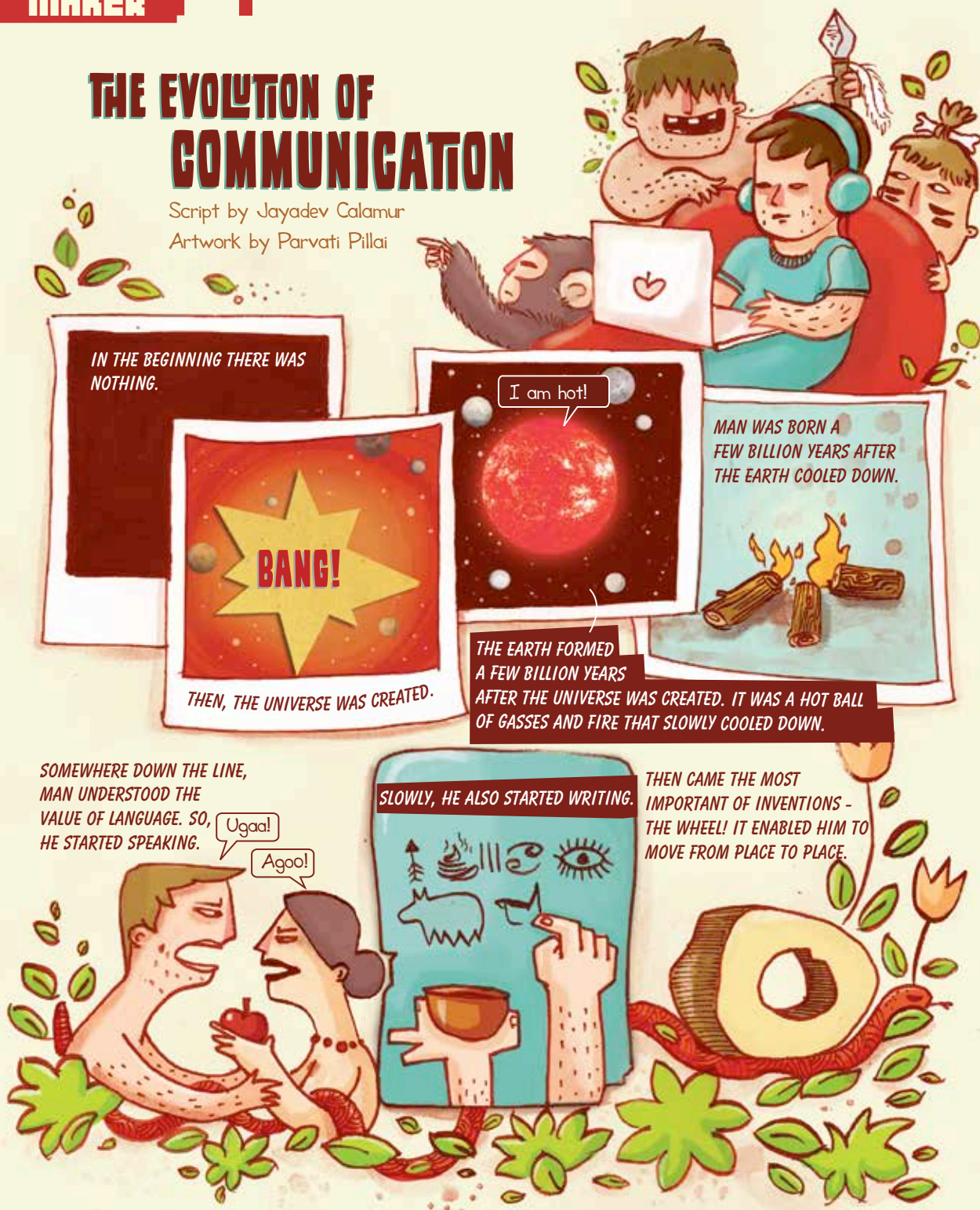
SOMEWHERE DOWN THE LINE,  
MAN UNDERSTOOD THE  
VALUE OF LANGUAGE. SO,  
HE STARTED SPEAKING.

Ugaa!

Agoo!

SLOWLY, HE ALSO STARTED WRITING.

THEN CAME THE MOST  
IMPORTANT OF INVENTIONS -  
THE WHEEL! IT ENABLED HIM TO  
MOVE FROM PLACE TO PLACE.





THE INVENTION OF THE WHEEL ALSO SPREAD COMMUNICATION FAR AND WIDE. IT BECAME AN INTEGRAL PART OF EVERY SOCIETY. PAPER, PENCIL AND INK WERE INVENTED. THE INVENTION OF THE PRINTING PRESS GAVE RISE TO THE NEWSPAPER AND MASS PRINT MEDIA.

SUDDENLY, THE WORLD BECAME SMALLER.

We have done our bit to bring the world closer!

**BREAKING NEWS!**  
Read all about it!

WITH THE WORLD GETTING SMALLER, THERE WAS A NEED FOR PEOPLE TO GET CLOSER. SOON, GRAHAM BELL INVENTED THE TELEPHONE. MARCONI INVENTED THE RADIO AND FARNSWORTH INVENTED THE ELECTRONIC TELEVISION SET.

WITH THE WORLD GETTING CLOSER, THERE WAS A NEED TO CONNECT. ELECTRONIC MAILES (EMAILS) AND SHORT MESSAGING SERVICE (SMS) BECAME THE WAY TO BE.

AND THEN EVOLVED THE LAPTOP, THE SMART PHONE AND THE TABLET.

THE WORLD HAS INDEED BECOME SMALLER!

TODAY, THOUGH THE EARTH LOOKS LIKE THIS -

IT FEELS LIKE THIS!

THANKS TO THE COMMUNICATION AGE!



## Fly and Beat the Traffic

*Flying tricycle*

**L**arry Neal from the United States has a solution to the mounting traffic woes. He has built a tricycle that flies!

The tricycle comprises a 582cc engine and a three-blade 68-inch propeller. It can fly at 56 kilometers per hour and land in 20 feet of space. It can reach a speed of 104 kilometers per hour. It has a five-hour flight time, which means that it can fly for this time without refuelling.

This vehicle costs 46,000 pounds, which is a little over Rs. 40 lakh! However, to own this, one needs a pilot's license. If this gains popularity, we might see mid-air traffic jams and empty roads. Strange fix, isn't it? ■

## Einstein's Unique Brain

**A**ll of us are aware that Albert Einstein was a genius. But, was his brain structure unique? Scientists have been trying to answer this question since his death in 1955.

Previously unpublished photographs of Einstein's brain were analysed in the November 2012 issue of the journal, *Brain*.

Scientists compared the visible part of Einstein's outer brain with 85 human brains that were previously described in scientific studies. They found that Einstein's brain differs from the average human brain – it is more convoluted and bumpier. This may be related to an increase in the neurons.

*Idea sent by Disha Ashar, Mumbai ■*

## A 'Bloody' Record

**J**ames Harrison, the 'man with the golden arm', holds a unique record for the most number of blood donations in the world.

Harrison had suffered chest complications as a child. At that time, he had received 13 litres of blood. Realising that the blood had saved his life, he pledged to regularly donate blood once he would turn 18.

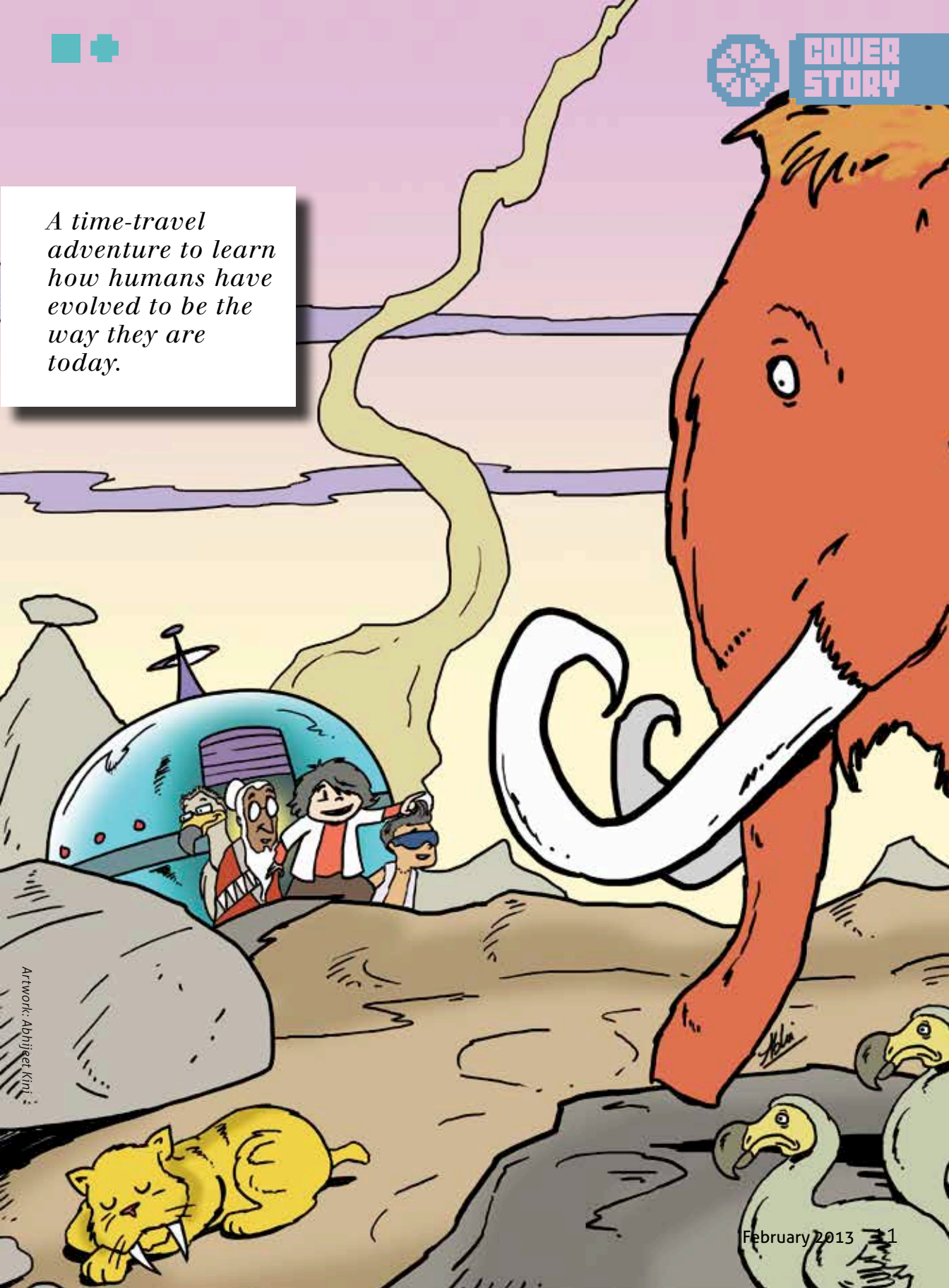
In the years since then, he has donated blood more than 1,000 times. He has saved two million babies from Rhesus disease, a deadly form of anaemia! His blood contains an **antibody<sup>G</sup>** that prevents infants from dying of Rhesus disease.

Now, that is giving back, isn't it? ■





*A time-travel  
adventure to learn  
how humans have  
evolved to be the  
way they are  
today.*



# Do the Evolution

*Food, shelter, clothing, language and machines - without these, is survival possible? Possibly not! Millions of years ago, as they evolved, our ancestors realized the value of these, laying the foundation for the modern age.*

1



*Australopithecus*

4 to 2 million years ago

## The Earliest Gatherers

**FossilG** records suggest that genus *Australopithecus* is one of the earliest ancestors of the modern man. The intelligence of this genus was likely not more sophisticated than that of the modern apes. They were the first bipeds, and gathered fruits, vegetables, roots, nuts and seeds for food.

2



*Homo erectus*

1.8 million to 300,000 years ago

## They Had Fire

This species originated in Africa and spread as far as Spain, Georgia, India, China and Java. They discovered fire and clothing, and were the first to migrate. They used fire to keep themselves warm and to defend themselves.

3



*Homo habilis*

2.3 to 1.4 million years ago

## The Earliest Handyman

*Homo habilis* was the earliest known species of the genus *Homo*. They were short and had disproportionately long arms. Their remains, found by anthropologists, are often accompanied by stone tools that are thought to be primarily used for scavenging rather than for hunting.

4



*Neanderthal*

300,000 to 30,000 years ago

## Let's Cook Food

This is the species that is closely related to the modern man. They lived in groups, built homes from animal bones and even cooked food by learning how to control fire. Some also cooked vegetables, giving rise to the first set of vegetarians.

5

50,000 years ago to present

## We Are Here!

*Homo sapiens* have, over the centuries, created many scientific advancements to ensure better life. They cultivated crops, made boats, used bricks to build homes, invented the wheel and communicated through speech.



# Eureka! He did it.

by **Jayadev Calamur**  
Characters created by **Vinayak Varma**  
© **Brainwave**

“Guys!” called Dr. Dodo. “Galileo-3 is all set to go back in time!”

“This is going to be fun,” said Arby.  
“Imagine, a close encounter with a primate!”

“Indeed!” said Alby. “Our encyclopedias will come to life!”

Dr. Dodo set the coordinates of the time machine back to a million years. A few zaps and zooms later, the time machine came to a halt and the Smarties stepped out.

“Look, Dr. Dodo,” said Alby laughing and pointing at a flock of dodos. “You have company.”

“Carry on with your observations,” said Dr. Dodo with a grunt.

“You know he is touchy about being the last dodo on the planet,” whispered Skree!

The Smarties soon spotted a cave with a **primate**<sup>G</sup> warming himself in front of a large fire.

“That is Homo erectus,” said Dr. Dodo. “He was one of the earliest primates. He invented a number of tools and discovered fire.”

The primate was wearing animal skin and was surrounded by a few animal bones and a dead animal.

“The cave is his shelter, the animal skin is his clothing, and the dead animal is his food – the basic necessities of life,” continued Dr. Dodo excitedly.

They all began to observe the primate with great interest. He took a tool that looked similar to a knife, cut up the animal and devoured it.

“That is disgusting,” gagged Alby. “I would not dream of eating food like that. Ew!”

“Also, you will not be able to. Humans are so accustomed to eating cooked food now that raw meat can be harmful to their digestive systems,” said Dr. Dodo.

“I hope that he washes his mouth and the animal skin he is wearing after eating in such a manner,” added Alby, who looked like he was going to be sick.

“Homo erectus discovered many things. But, hygiene was not his strong point, Alby,” laughed Dr. Dodo. He then explained how the concept of hygiene came into existence only after the origin of Homo sapiens. He also spoke about the Roman baths and how ancient religious texts have always advocated hygiene.

“If the Homo erectus did not observe hygiene, did he not fall sick?” enquired Alby.



"Well, he did. He used roots and leaves to cure himself because prescription medicine did not exist then," answered Skree! "Ancient Egyptians were the first to have a public health system and surgery, only 7000 years ago."

"Wow!" exclaimed Alby. "Today, we have antibiotics, vaccines and laser treatments, along with research to find permanent cures for dreaded diseases such as cancer and AIDS."

"But he has lit a fire. Why is he not cooking? It helps kill germs," questioned Arby.

"Ah! Homo erectus certainly discovered the value of keeping himself warm with a fire. But, the credit of taming fire to use it for cooking has been attributed to the Neanderthal man," replied Dr. Dodo.

"In fact," added Skree! "There have been

reports that Neanderthals were the first to cook vegetables."

"Yes," agreed Dr. Dodo. "But Neanderthals only gathered fruits, nuts and vegetables. It is the Homo sapiens who began to grow crops, about 10,000 years ago. Egypt, thanks to the Nile, parts of Western Asia and India were the first places where agriculture began."

"For the longest time, farming was organic. Then pesticides and chemical fertilizers were used excessively and now, we're back to adopting organic methods!" Alby remarked.

"What else did Homo erectus discover?" interrupted Arby, with great curiosity.

"He discovered clothing. He was the first to migrate and felt the need to adapt to changing surroundings. His clothing depended on the area he moved into,"





detailed Dr. Dodo. “In this process, clothing evolved. For instance, the ancient Romans wore togas and sandals to suit the climate they lived in.”

“If he was the first to migrate, why did he not invent the wheel? The wheel was invented only 7000 years ago,” asked Arby.

“Finding shelter was a greater priority for the Homo erectus. Caves and trees were his natural dwellings. Over a period of time, he built tents and twig huts,” replied Skree! “He might have realized that rolling logs help move things easily. But, he could not invent the wheel and **axleG** system.”

“Yes,” agreed Dr. Dodo. “Hence, they were invented only in 4000 B.C. Thanks to them, we had machinery, transport and the Industrial Revolution. These are responsible for our current advancements.

They continued walking and exploring further. “Look over there!” exclaimed Arby suddenly, while pointing towards a chimpanzee using a stone to break open a nut.



“Ah, we knew that man had always used tools. Now we know how it probably started!” chuckled Dr. Dodo.

“Man used tools for various purposes. Apart from hunting, cutting and defending himself, man used tools to carve pictures on walls. But that wasn’t until 50,000 years ago. There was no language before that,” Skree! added.

“Insane!” exclaimed Arby. “How did they communicate?”

“Our best guess is that they would speak through grunts and other sounds. It was the birth of communication,” replied Dr. Dodo. “As humans began to live in groups, communication became important. Sounds and signs soon evolved into paintings, spoken language, and later into the alphabet.”

“If there was no structured language or communication back then, how did man study and learn?” frowned Arby.

“Young ones would observe their parents do something and repeat that until they grasped it. Today, we have books, schools and colleges, but animals still learn by mere observation,” answered Skree!

“Necessity is the mother of invention!” remarked Dr. Dodo. “Speaking of inventions, we should rush back to the lab. I just had a “brainwave” for an amazing invention! I need to record it before I forget.”

Refusing to reveal any further, he rushed the rest of the Smarties back into the present.

What was Dr. Dodo’s “brainwave”? Did he manage to give life to it? Find out in upcoming issues. ■

# He Came, He Thought, He Conquered

*The modern man has always been curious. This distinction led to many great discoveries and inventions that have made life convenient today.*



**11,000  
YEARS AGO**

First boats were invented, making water travel possible. Earlier, primates migrated on foot.



**7,000  
YEARS AGO**

The wheel came into use in Mesopotamia, central Europe, and India.



**4,000  
YEARS AGO**

Wagons and wheeled chariots were built to travel.

Abacus, which was the earliest sign of computing data, was invented.

Man started using arithmetics.



**10,000  
YEARS AGO**

First known cultivation and growing of crops in Egypt and India.



**6,000  
YEARS AGO**

First writings were found in Egypt in the form of **hieroglyphics**. This laid foundation for the alphabet and modern day languages.



**9,000  
YEARS AGO**

First signs of rock and cave paintings were found. This was the earliest indication towards the evolution of communication.

The Indus Valley Civilization implemented the drainage system. This prevented flooding and waterlogging, a problem that still plagues us today.



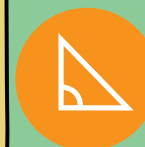
**8,000  
YEARS AGO**

Bricks were used to build homes.



**5,000  
YEARS AGO**

The Sumerians, in Mesopotamia used prescription medicines. They also conducted surgeries.



**1ST  
CENTURY  
B.C.**

Archimedes laid foundation for the use of mathematics to treat physical problems.

The Pythagoras theorem helped translate the structure of nature into numbers. It is very important in math and architecture even today.

The theory of the Earth being spherical was established.



## 1ST CENTURY A.D.

India introduced the world to the zero. Aryabhata gave birth to the modern decimal-based place value notation. Practical calculations were possible, making math a regular part of life.



## 2ND CENTURY A.D.

The Chinese invented paper, one of the most important inventions. Greek scientist Ptolemy compiled a list of all stars visible to the naked eye, laying foundation for modern astronomy.



## 15TH CENTURY

Nicolaus Copernicus propounded that the Sun is the center of the universe.

The invention of the printing press gave rise to the first newspaper and mass production of books, bringing the world closer than ever.



## 16TH CENTURY

Galileo Galilei made improvements to the telescope and paved way for modern observational astronomy.

Invention of the spinning wheel revolutionized the textile industry.



## 17TH CENTURY

Isaac Newton discovered gravity. He came up with the laws of gravity and motion that are important in physics even today.



## 18TH CENTURY

Benjamin Franklin invented the lightning rod.

James Watt made improvements to the steam engine, speeding up the Industrial Revolution.

Chemistry became an organized subject of study. Before this, most chemical phenomena were considered magic!



## 19TH CENTURY

Charles Babbage invented the mechanical computer, laying foundation for the PC.

Edward Jenner invented vaccination for smallpox and Louis Pasteur discovered that bacteria spread diseases, leading to an era of good health.

Mendeleev created the periodic table of elements based on atomic numbers. Using this, he could predict properties of elements yet to be discovered!

Advancements in electricity and transport boosted the Industrial Revolution and invention of key communication tools such as telegraph, telephone and radio.

Charles Darwin established the scientific theory of evolution, enabling man to understand life and nature better.

Benz invented the first motor car.



## 20TH CENTURY

The Wright brothers invented the aeroplane.

Television was invented, giving rise to the popularity of motion picture and entertainment.

Alexander Fleming discovered penicillin, marking the start of the usage of antibiotics towards improved life expectancy.

Man's first travel to space.

The Internet brought the world closer. Emails, social networking, and digital media became the way of the world.

DNA and genetics evolved into special sciences. A female sheep, Dolly was cloned successfully from an adult cell.



## 21ST CENTURY

Wi-Fi internet becomes popular and easily available.

The smartphone ensures mobile and instant communication.

Robotics and artificial intelligence gain prominence.

Alternate and perennial sources of energy such as solar, nuclear and bio-fuel get wider attention.



# THE MAD SCIENCE AWARDS

by **Sasikanth C**

*Forget the Nobel Prize.  
Let's read about three of the  
wackiest awards around!*

**S**omething new is discovered or invented every day. Amongst these, there are ones that are really weird and hence, receive special awards. Did you know that one such award is given to people who have "eliminated themselves from the human gene pool by doing something absurd!"



## The Darwin Award

As the name suggests, the award is named after Charles Darwin. It is awarded to *those who improve the gene pool by removing themselves from it via death or sterilization due to their own (unnecessarily foolish) actions!* Late 24-year-old Philip Quinn was given the Darwin award in 2005. Quinn died due to a lava lamp accident in the US. He tried heating the lava lamp on a stove, which resulted in an explosion.

## The Ig Nobel Prize

The Ig Nobel Prizes are given to those achievements *that first make people laugh and then make them think*. These awards are given out to celebrate unusual discoveries and inventions. The ironic thing is that winners of the Ig Nobel Prize receive their awards from the prestigious Nobel Prize winners! In 2012, Joseph Keller, Raymond Goldstein, Patrick Warren, and Robin Ball won the Ig Nobel Prize in physics for calculating the balance of forces that shape and move the hair in a ponytail!



## The Pigasus Award

This has to be the strangest of all awards. It exposes paranormal and psychic frauds. Winners are *notified telepathically and are allowed to predict their victory in advance!* The award resembles a pig that has wings. The award is distributed every year on April 1, which we need not tell you is also Fool's Day. ■



# Kiss those 'Key' Fears Goodbye!

by Kayomarz Bacha

*Some keys on a calculator can be intimidating.  
Dispel your fears by facing them head-on.*



Counting has always been an integral part of our lives. Computing goes back to 2400 BC in ancient Babylon. During this period, people would draw lines on sand and use pebbles to count.

Since then, computing has evolved to a point where we can place a 5" computer on our palm and carry out not one, but a variety of day-to-day activities. We have calculators everywhere – in mobile phones, desktops, laptops and touch pads.

We use a calculator to add, subtract, multiply, and divide. If we press any other key by mistake, we reset the calculator to

begin our calculation again. We do not usually try out the keys other than the ones that we are familiar with.

Today, let us explore these unfamiliar keys.

First, log on to [www.online-calculator.com](http://www.online-calculator.com). Notice the calculator there. There are a few keys on it that you may have never used. These are:

- MC
- MR
- M+
- M-

Now figure out what these keys do. ■

E-mail your answers to [kayomarz.bacha@ack-media.com](mailto:kayomarz.bacha@ack-media.com) and you can get a chance to be a part of our Student Board!



# THE SMARTIES

## THE DEADLY X-PERRYMENT

STORY: JAYADEV CALAMUR

ART & LETTERING: ABHIJEET KINI

THE SMARTIES ARE READING THE NEWS ONLINE.

GOOD HEAVENS. THESE ORGANISATIONS HAVE CAUSED SO MUCH HAVOC TO THE PLANET.

NEWS NOW!

BUT THEY HAVE BEEN GETTING DESTROYED OFF LATE. I WONDER WHO HAS BEEN DOING THIS.

THE NEXT DAY-

LOOK! ANOTHER LAB HAS BEEN DESTROYED BECAUSE IT EMITTED TOXIC WASTE INTO THE SEA.

THE PERSON HAS LEFT A CARD WITH 'X' ON IT.

WE BETTER GO AND INVESTIGATE. SOUNDS LIKE AN ECO-TERRORIST!

ZOOM INTO THE PICTURE, ARBY.

WHO IS THIS? IT IS REPORTED THAT THE CLUES AT THE SITE SAY THAT THE NEXT TARGET IS SYDNEY.

WE WILL TAKE THE FALCON. SHE IS THE FASTEST PLANE WE HAVE. WE CAN REACH SYDNEY IN TWO HOURS.

HEY! BHOO CAN TELEPORT US ALL TO SYDNEY.

BOYS, YOU KNOW THAT I DO NOT USE MY SUPER POWERS FOR EVERYTHING!

LET'S GO!

SYDNEY, THE LAND OF THE OPERA HOUSE AND BEACHES.

I AM UPSET WHEN PEOPLE MISUSE SCIENCE. SINCE THE INVENTION OF GUNPOWDER 1200 YEARS AGO, MEN HAVE BEEN USING SCIENCE TO CREATE MAYHEM.

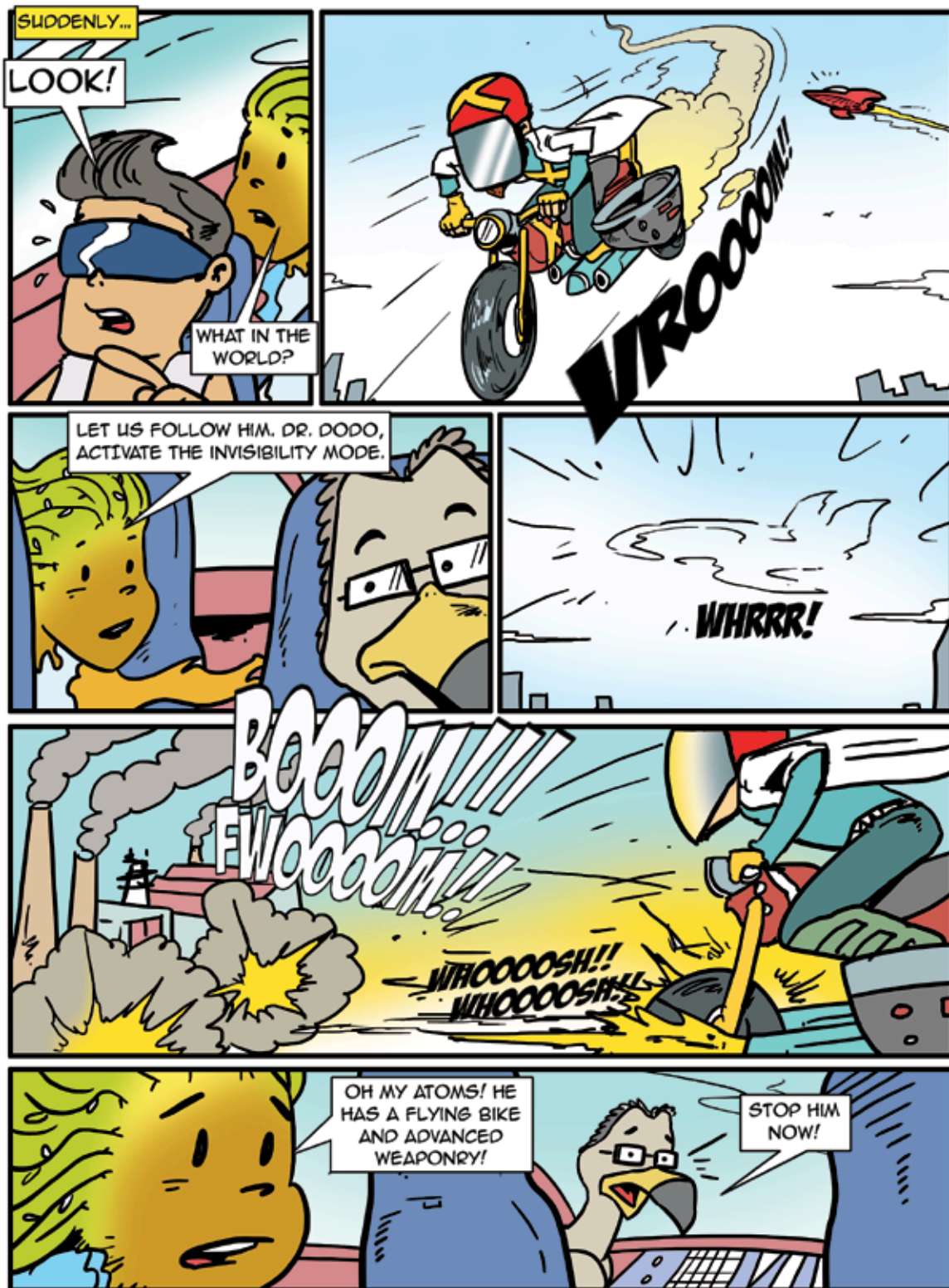
WHAT'S WRONG, DR. DODO?

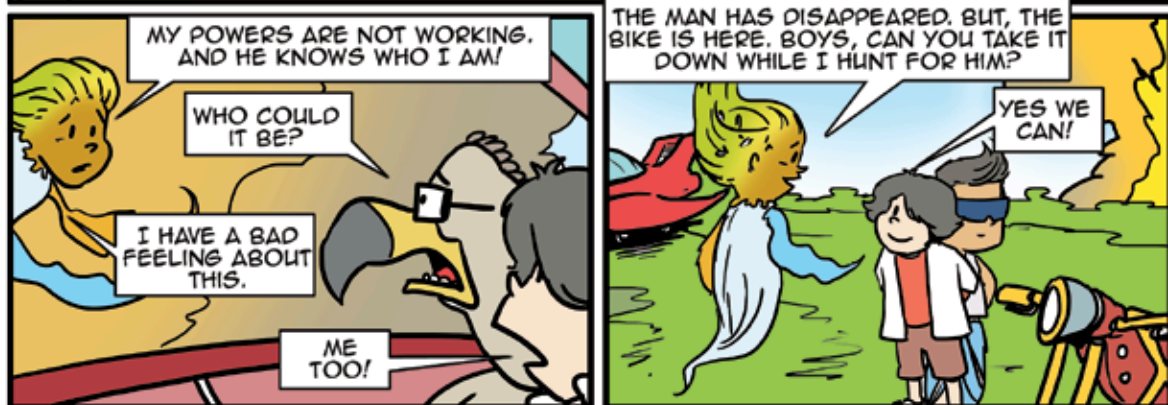
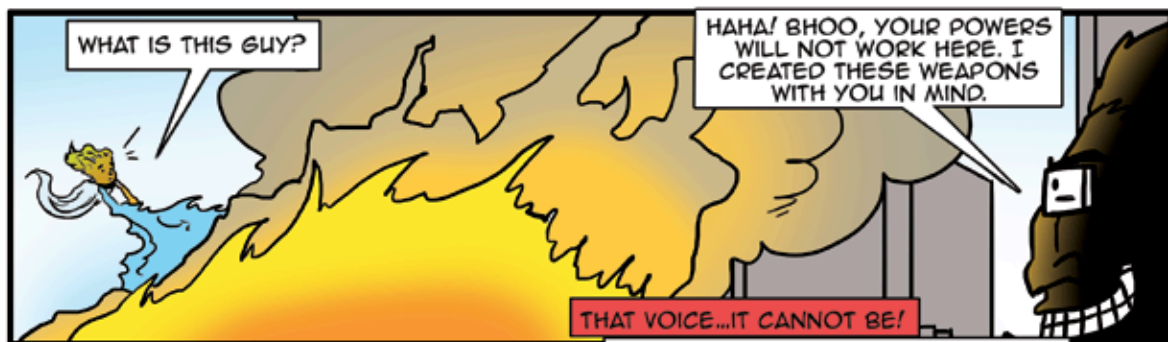
I AGREE. SCIENCE IS A DOUBLE EGED SWORD. WRONG MINDS USE IT FOR EVIL ACTIVITIES. FIRST IT WAS GUNS, THEN BOMBS AND MISSILES, AND NOW, EVEN CHEMICAL AND BIO-WEAPONS!

WE HAVE REACHED SYDNEY.

THINGS LOOK NORMAL. HAVE WE BEEN LED ON A FALSE TRAIL?







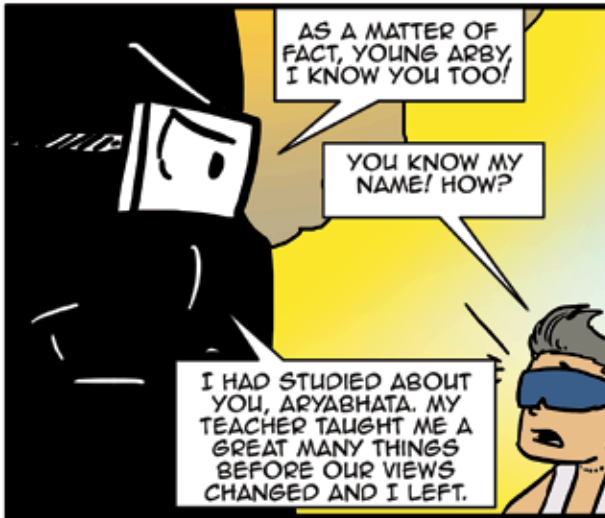




WHO ARE YOU? WHY ARE YOU HIDING IN THE SHADOWS?

YOU WILL KNOW EVERYTHING IN DUE COURSE OF TIME, BHOO.

HOW DO YOU KNOW BHOO ?



AS A MATTER OF FACT, YOUNG ARBY, I KNOW YOU TOO!

YOU KNOW MY NAME! HOW?

I HAD STUDIED ABOUT YOU, ARYABHATA. MY TEACHER TAUGHT ME A GREAT MANY THINGS BEFORE OUR VIEWS CHANGED AND I LEFT.



HENCE, I HAVE THE HIGHEST REGARD FOR ALL OF YOU. BUT, DO NOT TRY TO STOP ME. THESE PEOPLE DESERVE TO DIE.

WHO IS YOUR TEACHER?




THE MAN STEPS OUT OF THE SHADOWS.

YOU ARE, SIR!



XAVIER?

WHO IS XAVIER? WHAT HAPPENED BETWEEN DR. DODO AND HE? READ ALL ABOUT IT IN THE NEXT ISSUES.



*Fly like a fish  
and swim like a bird,  
For this world is big  
and blue, so you've heard.*

*It's a fresh and salty life that  
you will see,  
It's full of miracles and  
many a fantasy.*



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## DON'T FRET IF THERE IS NO TECH

**I**magine life without technology. It would be scary! Humans would have evolved, but there would be no gadgets, gizmos, and machinery.

On second thoughts, maybe if there were no technology, there would be a better balance on Earth. The planet would be one paradise where humans and animals coexist in harmony. Perhaps there would be no concept of "endangered" species, and everyone would work for the love of it and not for money.

If there were no technology, humans would still survive through farming and fishing. Using organic techniques and avoiding pesticides and chemicals, humans would ensure that they would live just fine. Since domestication of animals needs more skill than technology does, life would have been easy.

Without objects such as the wheel and telephone, how would people survive? For all you know, people would walk or run from one place to another. That way, they would keep themselves fit. As for

communication, they would sit and talk to each other and narrate stories that will pass from mouth to mouth over a period of time. At least, there would be no fear of things going viral on the Internet!

Without technology, life would still be normal. Maybe all we need to do is believe that. ■

**by Gopal Krishna, Age 12**

Email your science fiction stories to [brainwave@ack-media.com](mailto:brainwave@ack-media.com)  
The best one gets published here and wins a surprise gift!



Electricity and Benjamin Franklin are the correct answers for December 2012 issue *Treasure Hunt*. The winner is Sidharth B. Nikhil Udupa, Sathvik Sanjeev and Suyash Jaju too got the answers right. A special mention to them!

Nachiketa, P Janardhan, Nirmal Anand, Muhsin Mohamed, Nanki Arora, Husain Fatehi, Harsimar Singh, Rekha MN, Aditya B, Rupanshu Soi, Rajalaxmi N, Ravichandran K and Ambar Taneja send us one correct answer each.

Now, participate in all activities and win maximum prizes to get a merit certificate, the title of 'Smartenstein' and a mystery gift! Activities and contests in this issue: 'Ask Us Why p7', 'Toy Box p4', 'Eye See p19', 'Fan Fiction p26', 'Third Law p28', 'DIY p30', 'Planet Ninjas p37', 'Magic Science p37', 'Treasure Hunt p46', 'Sci-Q Time p47' and 'BW Fun-do Band p45'.

Winners of other activities are Ranjani R (*Third Law*), Suyash Jaju (*Story Storeys*) and Chayanika Boswas (*Ask Us Why*). To read their responses, visit <http://www.bwmag.in/category/contests>

A special mention to Kruthath Shah and Srijal Poojary for *Story Storeys*, and Husain Fatehi, Yash Garg, Srijal Poojary and Varun Girimaji for *Ask Us Why*.

Jan 2013 winners will be declared in March.



## LETTERS FROM READERS

I completely enjoyed the November and December editions. I am very happy that Brainwave is now 48 pages. The Treasure Hunt is a good addition. BW is simply superb! Divyang Momaya, Mumbai.

Dear Divyang,  
Thank you for your lovely mail. We hope that the future issues of Brainwave are as crazy and fun.  
JD, Editor.

I live in Delhi where the sun can harm you even in winter. I participated in a race, but to prevent sunburn, I used the sunscreen from Brainwave's DIY. I told my friends how I made it and became a superhero. Thanks to BW!  
Sobhana Krishna, Delhi.

Dear Sobhana,  
We are really glad that the DIY worked. Becoming a superhero feels good, doesn't it?  
Kayomarz Bacha, Resident Geek.

The 'Ask Us Why' in the November 2012 issue was shallow. It does not provide any detail about the number of ships and aircraft alleged to have vanished at the Bermuda triangle.  
Sabyasachi Ganguly.

Dear Sabyasachi,  
Thank you for the feedback. We will work on this aspect and improve ourselves.  
JD, Editor.

As a science magazine, Brainwave should send magazines in recycled paper packets and not plastic ones. This is good for the environment.  
Srijal Poojary, Mumbai.

Dear Srijal,  
Thank you for your mail. Your points are valid but unfortunately recycled paper packets do not solve the purpose of the magazine reaching out to all corners of India without damages. They get torn in transit or get wet in rain.  
JD, Editor.



# the Super Meet Parents

by Kashmira Sarode

*What if mom and dad ended up with superpowers one day? The thought is super exciting, isn't it?*

is possible. We would say, 'yes!' Ever heard of artificial intelligence (AI)? With AI, all it takes to create wonders that we can only imagine is a microchip!

Today, artificial intelligence has evolved beyond computer software. We have robots playing chess, having normal conversations, and even dancing to Gangnam Style!

Very soon, we might have vehicles that drive by themselves, **humanoids<sup>G</sup>** and even humans with superpowers. ■



It cannot be denied that mom and dad are super. They are always there for us and ensure that we lead a comfortable life. The ability to do this is indeed a superpower. Who else can be so selfless?

But, let us say that science had

its way and made dad into this guy wearing a suit that is fit with various super gadgets, just like Inspector Gadget! And that mom had a super suit that gave her powers akin to Elastagirl in The Incredibles!

You might ask us whether that

While we totally agree that mom and dad are awesome as they are, think of a few superhero gadgets and powers you would want them to possess. Email your thoughts to [brainwave@ack-media.com](mailto:brainwave@ack-media.com) with 'Third Law' as the subject and you can win our most recommended science fiction movie CD!

# ALL IT TAKES IS A TABLET

by Sasikanth C

**H**umans have been focused on health and disease prevention for thousands of years. In earlier times, they used roots and leaves as medicines. As civilizations flourished, medicines and medical treatment evolved. The ancient Egyptians and Greeks were the first to develop medicine. In fact, doctors, even today take the **Hippocratic Oath**!

For the longest time, herbal medicines were used, but slowly, scientific developments gave birth to modern medicine.

In the 19th century, Edward

Jenner invented the smallpox vaccine using a poxvirus that infects cows. Louis Pasteur discovered that germs cause diseases, which was a remarkable breakthrough in the study of causes and prevention of diseases. Soon, in the early 20th century, Alexander Fleming invented the first antibiotic - penicillin.

Since then, we have taken giant strides. Today, we have laser surgeries and treatment for certain types of cancer.

What will the next century hold for us? We can only guess! ■



# THE WORLD AIN'T FLAT!

by Sasikanth C

**F**or the longest time, it was assumed that the world was flat. Then, till the 1<sup>st</sup> century B.C. people thought that Earth was shaped like a dome or an inverted bowl.

When one thinks of the assumption that the world is flat, it seems silly because when you watch a ship coming from the horizon, you can see

it slowly rise from the end until it can fully be seen. This is an indication enough that the world is not flat, but people then were as stubborn as they are today! In fact, before the Americas were discovered, it was assumed that the world ended with the Atlantic Ocean!

Finally, somewhere, sense prevailed and ancient Greeks

began to refer to the Earth as a spherical structure.

This fact helped other scientists and thinkers come up with suggestions that the Sun is the centre of the Solar System and the Earth revolved around it. Slowly, they began appreciating the universe and understanding that **it's full of miracles and many a fantasy.** ■



# HEATING IT UP!

*Make a thermometer at home using just a straw and an empty plastic bottle.*

by Kayomarz Bacha



## Here is a list of things you need -

- An empty 500ml plastic bottle
- Food colouring or red ink
- A transparent straw
- All purpose flour dough
- 2 bathroom mugs
- A permanent marker
- A pair of scissors
- Ice cubes
- Hot water

## Method -

### Step 01

Pierce a hole in the cap of the empty 500ml plastic bottle. The hole should be big enough for the straw to go through. Make sure that you have an adult helping you with this.



### Step 02

With a permanent marker, draw five lines on the straw, dividing it into six equal parts. Mark these lines, from the top, as 'very hot', 'hot', 'room temperature', 'cold,' and 'very cold'.



### Step 03

Insert the straw into the plastic bottle through the hole in the cap. Make sure that only 1/4<sup>th</sup> of the straw is inside the bottle. Use the dough to cover all air gaps. Even the slightest gap will not allow the thermometer to work







#### Step 04

Fill the bottle with regular water, almost till the top and add a few drops of food colouring. Screw the cap back on. Ensure that the bottom end of the straw is below the water level.



#### Step 06

First, place your thermometer in the hot water mug for a minute and notice what happens. Be careful while handling the mug containing hot water. Then, place it for 3-5 minutes in the ice and note down your observations. ■



#### Step 05

Take the bathroom mugs and place them next to each other. Fill one with hot water and the other with ice cubes.



#### What do you notice?

If you have constructed the thermometer properly, the water level will rise when there is an increase in temperature.

Similarly, the level will come down with a dip in temperature.

Do you know why this happened? Ask your teacher or research on the internet and email the science behind this trick to [kayomarz.bacha@ack-media.com](mailto:kayomarz.bacha@ack-media.com) and you can win a top grade industrial thermometer<sup>G</sup>!



Theodore L'Hibou is a bird of modest habit and unremarkable appearance. His home-office up in a drab old tree isn't much to hoot about either.

Under L'Hibou's feathery exterior lies (among other things) a brain whirring with tremendous capacity.



Inside this brain are more ideas than even the modest owl can't count. Some of these could even change the world...



# THE GREATEST THINGS NEVER INVENTED

by PRABHA MALLYA







Y A T A W X \*

**\*TRANS-PLANTS**  
making photosynthetic meals for you, on you!

A ← M A Y \*

**\*MEAL PILL**  
It's a complete balanced meal in ONE capsule!

Y M T V  
A Y I I A → \*

**\*REPORT CARD FOR TEACHERS**  
telling them what they need to know!

We got hold of a few of his notes, and these translations took seven years to make!

W Y A > Y M Y \*

**\*SLEEP BATTERY**  
store up sleep for when you need it the most!

**\*PORTABLE BLACK HOLE**  
Say goodbye to heavy school bags! Carry all you need in a matchbox!

W A M V Y  
V M I I → V \*

**\*DOWNLOAD-A-DREAM!** Store and transfer your very own memories and dreams using this handy device!

← A M M → V W \*

**\*CANNED LANGUAGE**

Swallow the contents of this can, and read, write and speak a new language - instantly!

The End..



# The Toy Man's Tale



*Imagine a job where you play with toys. Isn't that a career that we all would love to have?*

by BW Labs

**A**lby and Arby visited the Children's Science Centre located in the Inter-University Centre for Astronomy and Astrophysics in Pune, India to meet scientist and toymaker, Mr. Arvind Gupta.

Mr. Arvind Gupta has, for over 20 years, worked towards making science fun for children through innovative teaching methods. He is a graduate of the Indian Institute of Technology, Kanpur, India.

He has won awards for his lifelong commitment and passion towards popularizing science and for his contribution to designing science-teaching aids for children.

Excerpts from the interview:

**Q: How did you begin making toys out of waste?**

**A:** In 1978, I spent a year with the Hoshangabad Science Teaching Programme (HSTP), which aimed at making science learning meaningful and fun for village children. We looked

at locally available, low-cost things such as matchboxes, injection bottles, old postcards, newspapers, etc. to design science experiments.



**Q: What inspired you?**

**A:** At that time two books deeply inspired me. One was - *Preparation for Understanding* by Keith Warren. In an experiment, children moulded four equal balls of clay into different forms – animal, cube, cup, and a plate. They were then asked which was heavier. This was an amazing way to convey the concept of conservation of weight!

The second book that inspired me was the *UNESCO Source Books for Science Teachers*. This book was published after World War II and used a lot of throwaway things to teach science creatively. This book is still considered a bible for science teachers.

**Q: You have been in this field for many years now. What is the most remarkable thing you have learnt?**

**A:** Thirty years back, chalk and talk was the dominant paradigm. Today, it is mandatory for a lot of schools to have physics, chemistry, biology, and also a mathematics laboratory. This radical shift from passive to active learning is welcome.

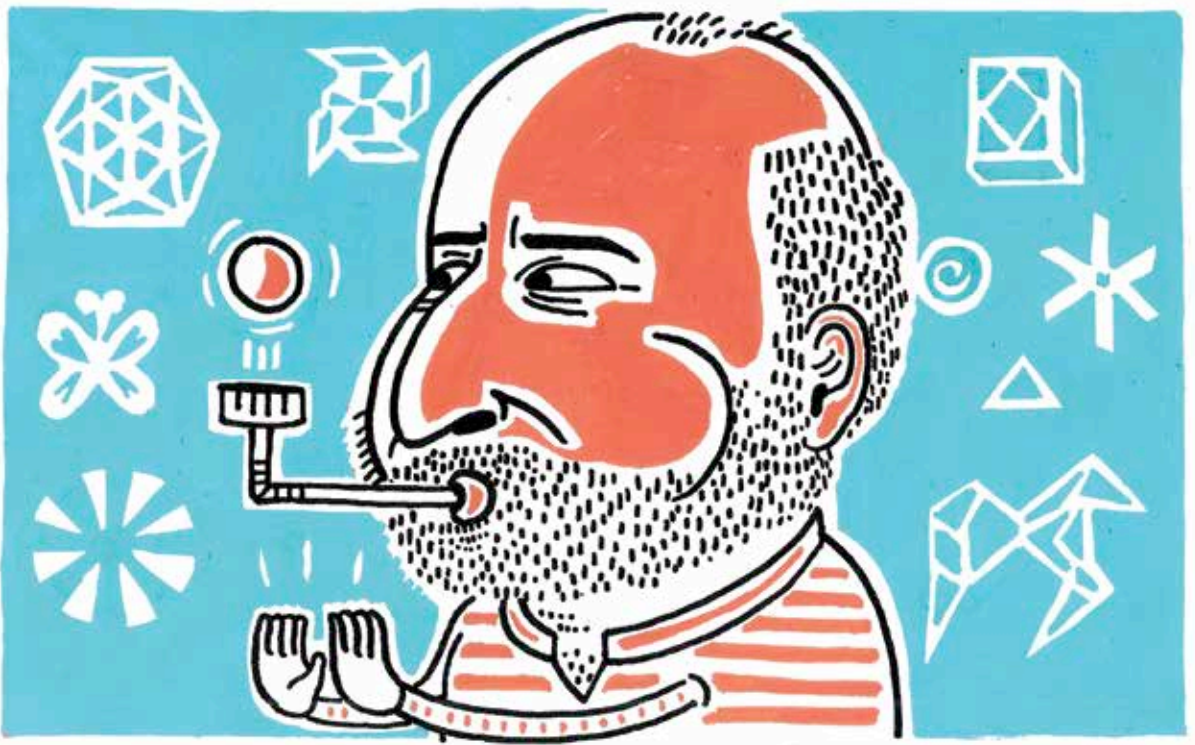
But many teachers still come from a not very effective system and are not skilled in making science models or toys. Children, on the other hand, love making things and are enthralled with toys.

**Q: Is there a toy that holds a special place in your heart?**

**A:** One toy I have adored is the simple electric motor. It uses an ordinary 1.5 volt torch battery, magnet, safety pins, rubber bands, and some insulated copper wire. The motor takes less than 5 minutes to make. It is delightful! When I first made it 23 years back, I would often wake up, play with it for a while and go back to sleep!

You can watch a video of this motor at <http://www.youtube.com/watch?v=vSPFwibREUg>





**Q: How do children who have played with these toys fare in exams? Do they begin to perform better?**

**A:** It is difficult to comment. Our examination system in several ways excludes creativity. If rote learning is encouraged in any system, children are bound to be less creative. Children who learn science through activities have great fun and are good with their concepts.

**Q: Do you think that the Indian market should promote science toys more?**

**A:** Of course they should, for their own good. China has flooded the world market with wonderful and affordable toys. Our

toy industry is primitive in comparison.

**Q: What message would you give to children who fear science and mathematics?**

**A:** Science and mathematics are taught in a dreadful way. No wonder you dread the subjects. Learn through application and not through theory alone. Love science like you love art or poetry, because it is beautiful.

**Q: What advice would you give to teachers and parents, with regard to teaching their children science?**

**A:** The first principal of true teaching is that nothing can be taught. Parents and teachers are merely guides.

Take children to the root of a concept and then, let them discover and learn. Parents should never ever live their own unfulfilled dreams and aspirations through their children. If children don't learn science, it is not the end of the world. Help them become better human beings.

**Q: How can children follow your advice without wilting under the pressure from the current system?**

**A:** They should understand concepts and not memorize. This will give them real joy and the power that they can figure things out. Children must compete against themselves, not compare with others. ■



# INVENTIONS JUST GOT CRAZIER

by Sasikanth C

*When babies mopping floors and people sleeping in trains while standing have become a regular sight.*

**W**e look at inventions such as the telephone, the personal computer, paper, electric lamp, the car, etc. and appreciate the value that they have given us. We cannot imagine life without them!



Noodle eater's hair guard

On another end of this spectrum, we have crazy inventions, which make us wonder why they exist in the first place. However, we cannot deny the fact that they do stand out. Here are some of the wackiest inventions that we have seen.

## Baby mop

Poor babies! A mop is attached to their clothes. When the babies crawl, this mop goes along the floor to clean up the mess. The Children's Welfare Department should definitely examine this 'mop'.

## Cockroach swatter slippers

Cockroaches are pests that annoy us all the time. So, instead of bending and chasing them around with a slipper, why not just convert the slipper into a club and swat them? We must admit that although this is a crazy invention, we would not mind owning one.

## Noodle eater's hair guard

This is for people who make a mess while eating noodles. Many complain that the free ends of their long hair fall into the noodle bowl. To prevent this, just try on this weird prop. We wonder what looks sillier - wearing this guard or letting one's hair fall into a bowl of noodles!

## Train helmet

The train helmet has a suction pump attached to its back, to stick to the train windows. This enables you to have a peaceful sleep and not fall off because of brakes being suddenly applied. So if you thought this was a regular helmet, now you know that it certainly isn't.

## Sleeping stand

Similar to the train helmet, this also is a sleeping aid. It looks like a regular underarm crutch. But in this case, it comes up to one's chin. The padded top is curved upwards to form a rest. You can conveniently place your chin on it and sleep while standing and travelling! ■



CNG station: Image by Mrehan

**F**uel is an expensive, but essential commodity. It is needed for a number of things such as to run vehicles, generate electricity and cook food.

# FOR FUEL'S SAKE

by Jayadev Calamur

*Here is a little exercise that can help you become a planet ninja!*

There are several alternatives to the regular forms of fuel. An example is bio-diesel. These alternative forms of fuel give more value for our money, and are eco-friendly and renewable.

Here is a task for you to know some practical aspects of day-to-day fuel consumption. Go to your nearest petrol bunk, note down the prices of petrol, diesel and CNG, and answer the following questions:

- 1 How much does a regular bus ticket to your school cost? What is the cost if you use your dad's bike or car? What is the difference?
- 2 Why do people prefer vehicles that run on diesel over the ones that run on petrol?
- 3 What is CNG? What is the price of CNG per litre? Is it beneficial than petrol and diesel? Why? ■

Ask your parents and teachers for help and use the internet. Research well and email your replies to [jayadev.calamur@ack-media.com](mailto:jayadev.calamur@ack-media.com) to get a chance to be part of our Student Board.

# Magic Flame!

by Kayomarz Bacha

**A** simple trick to amaze yourself and your friends with. All you need is a candle and a matchbox.

**Caution:** Please ensure

parent supervision while doing this and do not play with fire, ever.

Light the candle and let it burn for 20–25 seconds. Light a matchstick and hold it ready.

Now, blow out the candle flame. Quickly hold the lit matchstick to the smoke of the extinguished candle.

If you do it right, some amazing magic should take place. ■

Research and tell us how this happened. Write to [kayomarz.bacha@ack-media.com](mailto:kayomarz.bacha@ack-media.com) and get a chance to win an Amar Chitra Katha animation CD!





# A cell is all it takes



Dolly with her creator, Dr. Ian Wilmut - Wikimedia Commons

*Imagine creating life artificially! Through cloning, this is possible.*

by Dr. Dodo

**T**he tale of genetics is a fascinating one. It began in the 19th century when Gregor Mendel, a German monk carried out experiments with a pea plant and discovered that some traits that are passed from parents to offspring dominate over the other traits. Since then, several scientists have carried out studies to understand heredity better. In the process, scientists have even created life artificially through cloning!

Cloning is a process where a **genetically identical**<sup>o</sup> replica is produced from the cell of a living organism. It is relatively easy to produce a clone from a microorganism or a plant, but it is a more complex process to make a mammal

clone. Yet, scientists have managed to create a few cloned mammals. Here are some of the popular ones.

## Dolly

Dolly the Sheep was cloned by Sir Ian Wilmut at the Roslin Institute in Edinburgh, Scotland. Dolly was born on July 5, 1996 and lived up to the age of six. According to scientists, the average age of sheep can go up to 11 years. Dolly was born to three mothers – one carried the DNA, another provided the egg and the last carried the embryo. She did not have a biological father! She lived all her life at the institute and even had six lambs – Bonnie, Sally, Rosie, Lucy, Darcy and Cotton.

## Snuppy

Although the name sounds similar, it has no relation to Snoopy. Snuppy was an Afghan hound that was cloned by Dr. Hwang Woo-Suk and his colleagues at the University of Seoul in South Korea. Snuppy was born on April 24, 2005 and still lives. The dog was cloned using the cells taken from an adult Afghan hound and 123 **surrogate mothers**<sup>G</sup>. Only three of these produced pups and Snuppy was the sole survivor.

Snuppy was also used in the first breeding between two clones. This resulted in the birth of 10 pups!



*Snuppy, the Dog (right) - Wikimedia Commons*

## Cloned Frozen Mouse

A 16-year-old frozen mouse was successfully cloned in Japan in the year 2008. The experiment, which produced four offspring, was the first to involve a frozen animal.

Following this experiment, scientists have toyed with the idea of creating clones from frozen fossils like that of the woolly mammoth! Hopefully, there will not be another ice age because of this! ■



*A cloned mouse; Image by Janet Stephens*



# THE TIME TRAVELLING KUMARS

Story by Jayadev Calamur  
Artwork by Devashree Dhakras

...continued from previous issues.

The Time  
Machine  
comes to  
the present  
from New  
York in  
1879.

ZAAPPPP!

Wow! That  
was some  
adventure!

Yes! We did it!

Ah! now that we have proved that  
the machine works, you can tell your  
boss to continue funding.

Prove it.

But, we just  
did!

What! Let me check.

You did  
nothing! You  
just sparked  
off for a  
second and  
reappeared.  
You call that  
time travel?

Mohan walks back to the time machine  
to check what went wrong.

The panel on the machine  
shows a time of 20:35.

We left at 20:35 and are back  
at 20:35 on the same day in  
the same year!

How is that  
possible?



I am not sure. But, it means that while we went through **wormholes**, experienced displacement, and even met Edison in New York in 1879...

...for a person looking at the machine from outside, we didn't go anywhere. It was just sparks for a few seconds.

Uh..oh! What do we do now, dad?

Agree to stop your research, Dr. Kumar!

No! It is my life's work. And it works! Come with me. I will prove it to you.

And soon...

I am not getting into that thing!

I refuse!

How else can we prove that we did travel in time?

**RRRRRING  
RRRRINGNG**

Sir? Yes, sir. He is asking me to travel in time with him, sir.

Don't argue and do that! Check it out yourself!

Okay. I will come with you. But, if it doesn't work I will personally ensure that your project fund is withdrawn.

Ok. Geeta, Dinesh, you wait here.

Ok.

While I set the controls, do not touch any button.

Please! Do not make it sound as if this thing works.

No! I told you not to!

**CLICK!**

**ZAAPPPP**

After a few zips and zaps, it comes to a halt.

Dr. Kumar, nothing has happened again. Your machine is a failu...AAAARGH!

The machine whirs into action.

To be continued...



by Jayadev Calamur

## James Bond Saves the Whales



**H**ollywood actor Pierce Brosnan, famous for his role as James Bond, is associated with several environment related causes. One of his biggest contributions is teaming up with the National Resources Defense Council to challenge the United States Navy's deployment of a sonar system in over 75% of the world's oceans. This move is to protect marine life that is affected by the sonar system.

If only Brosnan had Bond-like gadgets to save these creatures! But for the attempt, we still find him cool.

**B**rad Pitt has become a well-known name in green circles. He has a passion for sustainable architecture and has donated generously for the development of green buildings. Pitt has already begun projects in New Orleans, USA and Dubai in the UAE.

The actor also narrates a show called *E2 design* in the US based TV channel, *PBS*. *E2* showcases pioneers in the field of sustainable architecture and how their work has provided apt solutions to environmental and social challenges.

## Pitt Supports Green Buildings



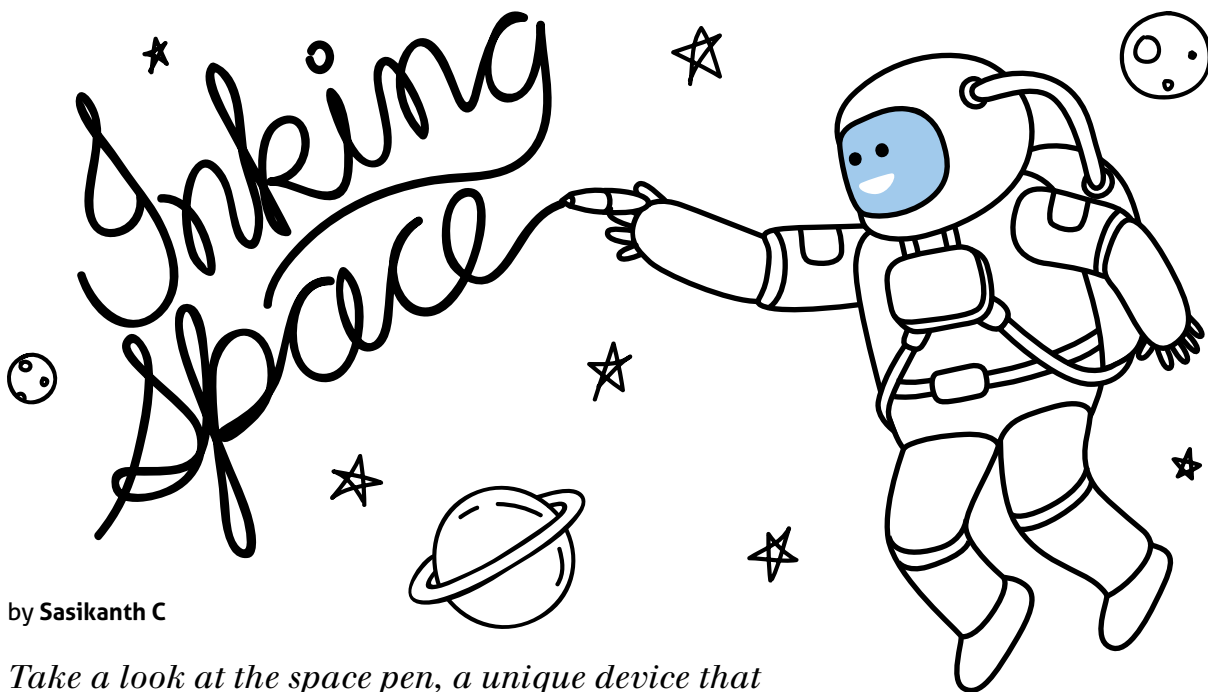
## Piggy's Green Donation

**B**ollywood actress Priyanka Chopra is quite the environmentalist, despite her busy acting and singing schedule. She is the brand ambassador for *Greenathon*, an environment awareness campaign launched by Indian news channel, *NDTV*. For the last four years, Chopra has raised awareness towards major environmental issues.

In 2012, along with several other

environmentalists, she helped clean the Yamuna River in Agra. "This time we began our campaign from Agra because tourist inflow is maximum here. Taj Mahal is on the bank of river Yamuna, which has become a dumping zone of waste materials. If we do not protect our environment now, our future will be dark," she said.

That is not all. She has also adopted a tiger and a lion. Now, that is dedication! ■



by Sasikanth C

*Take a look at the space pen, a unique device that enables astronauts to write in space.*

**M**an's curiosity about life beyond Earth began a long time ago, after he realized that **the world ain't flat!** Copernicus laid the foundation for astronomy when he propounded that the Earth is not the centre of the universe. Several others, including Galileo built telescopes to study celestial bodies. Similar research went on for centuries. However, the first man-made space shuttle, the V2 rocket, went to space only during World War II.

Since then, space travel and astronomy have taken completely new dimensions. Today, the Curiosity Rover is exploring Mars, while the Hubble telescope is capturing images of

stars and planets far away!

Technology has advanced rapidly. One key advancement is the space pen. Why was this pen invented? Don't astronauts have computers? Simple: when astronauts are in a suit exploring space, they cannot input data into a computer. They need pens to take notes.

This pen is made of tungsten carbide. It is designed in such a way that leaks are avoided. It uses pressurized ink cartridges that enable one to write at very high altitudes and in temperature ranging from -35 to 120 degrees Celsius! It has a shelf life of 100 years and costs Rs. 2500, which actually is very reasonable given its utility.

People may ask, "why not use a pencil instead?" It is a logical argument, but this pen can be used in zero gravity, underwater, over wet and greasy paper and at any angle.

Another reason why the pen is preferred over pencils is that the wood in pencils is flammable and the graphite can be easily broken. Also, the wooden flakes and broken graphite dust from pencils can spoil the electronics on space ships, in a zero gravity environment.

All said and done, the space pen has etched its place in history as the gizmo that helped man record his outer space tales. ■





# Indi-Rap

*Take a look at India's contribution to science, in verse.*

by Arby

I'll tell you a little tale, where I began the hero,  
My contribution to mathematics isn't just the zero.

In fact, through observations and many a try,  
I managed to approximate the value of pi.

But this isn't just about the things I have done,  
Many others too have applied science and made learning fun.

India's contribution to science goes well before my time,  
Where we sowed and reaped, and domesticated crops just fine.

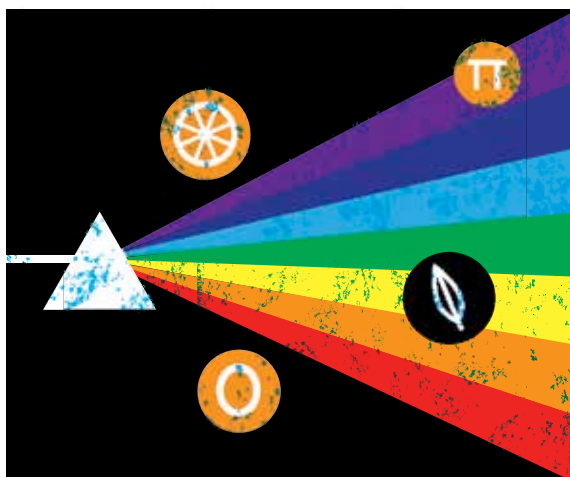
India also played a significant role in the evolution of the wheel,  
Which laid the foundation of machinery and the Industrial Revolution zeal.

And I'm not the only Indian mathematician around,  
There was a dude called Ramanujan who was numerically sound.

He contributed to several mathematical theories,  
And solved many doubts and queries.

India is not famous just for its mathematics,  
Scientists have come up with many scintillating facts.

Then came Sir C.V. Raman with his theory of light,  
He proved that it scatters; the theory was bright.



His studies won him a Nobel Prize in Physics,  
This theory was important in the study of optics.

The Boses too played a significant role in the study of sciences,  
Jagdish Chandra and Satyendra Nath helped developed appliances.

The former made several contributions to Botany,  
While the latter researched in detail with Alby.

As you can see, India has done just fine,  
In the invention and discovery timeline.

There is so much more that has come from here,  
And there will be a lot more year by year.

# Join the BW FUN-DO BAND

Win gifts through out the year  
while you learn with fun!

## 5 easy steps!

### Step 1

Form a group with four other friends who are not subscribers of Brainwave.

### Step 2

Give your group a name (e.g. The Smartensteins) and choose a captain.

### Step 3

Email the full names of your group, members and captain to [brainwave@ack-media.com](mailto:brainwave@ack-media.com)

### Step 4

Click on the website link that we email to each of you and register.

### Step 5

As a group, perform DIY (P30), Toy Box (P4) and Magic Science (P37) every month. Submit your observations and start winning!

Every month, the top group wins goodie-bags with posters, comics, CDs, cool BW friendship bands and more.

At the end of each year, top 5 groups win the BW Fun-do Band 'Hall-of-Fame' certificates, mementos and t-shirts!

Every year, the best group will also win a rolling shield.

**Go, gather  
your friends  
now and have  
five times the  
fun!**





## Treasure Hunt!

The Treasure Hunt is back. This time you will feel like you are actually hunting for buried treasure! There are **four clues** located at strategic points of the magazine. One will lead you to the other till you unearth the theme of the next issue. The first clue is in the Editor's Note!

oooooooo

Start now! Rake your brains, scratch your heads and come up with ideas to find it.

The first and most accurate entry will win a gift voucher worth Rs. 1000. Write to us at [brainwave@ack-media.com](mailto:brainwave@ack-media.com) with 'Treasure Hunt' as the subject.







**p10**

**Antibody:** Proteins that are generally found in the blood that detect and destroy invaders such as bacteria and viruses.

**p12**

**Fossil:** The remains of organisms of the past, such as skeletons or footprints, embedded and preserved in the earth's crust. These help scientists understand how life on the Earth was and how it evolved.

**p13**

**Primate:** The closest animalistic relative to humans, sharing about 96% of their DNA. These are mammals with forward facing eyes and very flexible fingers, legs and arms.

**p15**

**Axle:** A cylindrical rod to which a wheel or often, two wheels are connected. An axle enables the wheel carry greater loads while efficiently overcoming the friction generated.

**p16**

**Hieroglyphics:** A form of writing in ancient Egypt in which letters are denoted by pictures.

**p28**

**Humanoids:** A being, usually a robot, that resembles humans in shape.

**p29**

**Hippocratic Oath:** An oath taken by physicians and other healthcare professionals swearing to practice ethically and honestly.

**p31**

**Industrial thermometer:** A thermometer used for industrial purposes. It is more durable and can be used across a wide temperature range than a clinical or lab thermometer.

**p38**

**Genetically identical:** Organisms that possess the same DNA.

**p39**

**Surrogate mother:** A person or an animal who bears a child for another; a mother substitute.

**p41**

**Wormhole:** An imaginary shortcut through space and time. In science fiction, they are considered excellent time travelling portals.

## Sci-Q Time!

Finished reading the magazine?  
Answer these simple questions to win  
a mystery gift:

1. Which primate was the first to control fire?
2. Even though he realized that rolling logs moved things easily, pre-historic man did not invent the wheel. Why?
3. Which scientist invented the Smallpox vaccination?
4. Why is the Pythagoras theorem important to us? How does it help?
5. which of these animals has not yet been cloned? A. Dog B. Sheep C. Human

o o o o o o o o o o

**Parents and teachers, here's something unique for you. Make science a game that your children and students would love to play:**

[www.facebook.com/groups/BW.PTE.Collab/](http://www.facebook.com/groups/BW.PTE.Collab/)

**Readers, get to see behind the scenes:**

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**PARLE**

**Kaatun kya!**

**Doon kya?**

**PARLE POPPINS**

Bachchon ki toli maange  
sirf rangon wali goli. Kyonki ismein hain  
itne saare flavour ki sabko dene ka mann kare.

**Toh POP-in karo POPPINS  
aur Bolo, "Doon Kya?"**

everest PB 9/10-12

## WHAT IS BRAINWAVE?

Brainwave is a children's science magazine from the house of Amar Chitra Katha and Tinkle.

We understand that each child has a different aptitude and love for science. Hence, we simplify science into forms that excite them - comics, stories, fun-do activities, contests and fascinating facts.

**Give your child a Brainwave, and science will be just another game!**